

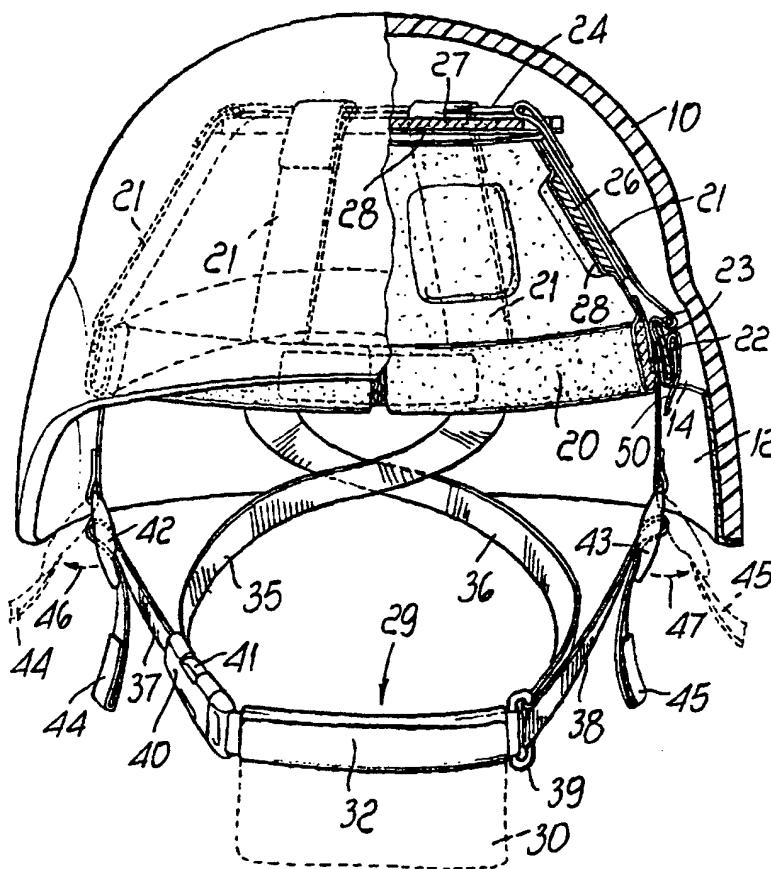
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/EP94/03429 (22) International Filing Date: 18 October 1994 (18.10.94) (30) Priority Data: MI93A002242 22 October 1993 (22.10.93) IT (71) Applicant (for all designated States except US): SISTEMA COMPOSITI S.P.A. [IT/IT]; Via Friuli, 55, I-20031 Cesano Maderno (IT). (72) Inventor; and (75) Inventor/Applicant (for US only): TOVAGLIERI, Piero, Guido [IT/IT]; Via Giuseppe Mazzini, 26, I-21052 Busto Arsizio (IT). (74) Agent: FORATTINI, Amelia; Internazionale Brevetti Ingg. Zini, Maranesi & C. S.r.l., Piazza Castello, 1, I-20121 Milano (IT).			(81) Designated States: US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>Without international search report and to be republished upon receipt of that report.</i>

(54) Title: HELMET-LIKE BULLETPROOF PROTECTION DEVICE

(57) Abstract

A helmet which includes: a crown (10) molded from a composite formed with a polymeric material and a reinforcement fiber; an adjustable internal harness (11) which operates by traction and is meant to support the weight of the crown; a thin part (12), which is substantially thinner than the crown (10) and is fixed inside it; and anchoring parts (14-19) which are arranged on the thin part (12) to allow the anchoring of the harness (11). The helmet allows to achieve maximum reliability.



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HELMET-LIKE BULLETPROOF PROTECTION DEVICE

The present invention relates to a helmet-like bulletproof protection device. In particular, the invention relates to a device to be used by armed forces and by law enforcement authorities, of the type which includes a crown molded from a composite formed with a polymeric material and a reinforcement fiber, so as to ensure great protection. More particularly, the helmet includes an adjustable internal harness that operates by traction and supports the weight of the crown. The harness has the purpose of ensuring both safety, by preventing direct contact of the user's head with the crown, and comfort, allowing ventilation of the head. In the central part, at the level of the forehead, the harness includes a band for the head, also known as sweatband, made of soft material and covered with leather. In the lower part, the harness includes an adjustable chinstrap that supports the chin-rest and a safety strap.

The polymeric material is for example a thermosetting resin, particularly a polyester or epoxy resin. The reinforcement fiber can be formed for example by Aramid fibers, and molding can occur under pressure as taught in Italian patent no. 1 084 884.

The above is the main field of industrial application of the invention but is not a limitation thereof.

Italian utility model no. 213 788 describes a device of this type that combines great protection and comfort. In

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particular, the harness must be anchored in a very stable manner to the crown, and therefore multiple metal through couplings, such as for example screws, are used. However, this entails a localized weakening of the crown. Ballistic tests have in fact shown that when a bullet hits one of the screws the penetration force of the bullet is sufficient to dislodge the screw and drive it into the head of the dummy that is used. Furthermore, the sweatband includes metal anchoring springs which are another possible source of physical injury. Finally, the chinstrap and the safety strap must be adjusted independently to adjust the harness.

The aim of the present invention is to overcome the above described drawbacks and provide a device that achieves maximum reliability and protection in all points of the crown.

An object of the invention is to eliminate all metal parts throughout the device, thus preventing a source of danger as well as corrosion problems.

Another object of the invention is to provide a single adjustment for the chinstrap and for the safety strap.

Another object of the invention is to allow complete removal of the harness from the crown without requiring the use of particular tools, such as screwdrivers or keys.

Another object of the invention is to allow to choose at all times between a chin-rest with a single strap arranged

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under the chin and a chin-rest with two straps arranged under and in front of the chin.

This aim, these objects, and others are achieved by the device according to the invention, which includes: a crown
5 molded from a composite formed with a polymeric material and a reinforcement fiber; an adjustable internal harness which operates by traction and is meant to support the weight of the crown; a thin part, which is substantially
10 thinner than the crown and is fixed inside it; and anchoring parts which are arranged on the thin part to allow the anchoring of the harness.

Whereas the polymeric material that forms the crown is
15 generally thermosetting resin, the thin part is preferably made of a thermoplastic polymer, particularly when the device is to be mass-produced. The thin part is fixed to the crown with an adhesive, preferably of the polyurethane type.

20

The invention will become apparent with reference to the description of a preferred embodiment of the invention, illustrated in the accompanying drawings, wherein:

25 Figure 1 is a front perspective view of the device according to the invention;

Figure 2 is a bottom perspective view of the device of Figure 1;

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Figure 3 is a partially sectional side view of the device of Figure 1;

Figure 4 is a partially sectional front view of the device
5 of Figure 1;

Figure 5 is a bottom view of the device of Figure 1; and

Figure 6 is a sectional side view of a detail of the device
10 of Figure 1.

With reference to Figures 1 to 6, the crown 10 contains an adjustable internal harness 11. A thin part 12 is fixed inside the crown 10. The thin part 12 is shaped like a band
15 that internally lines the lower part of the crown. Conveniently, the thin part 12 covers the lower rim 13 of the crown 10. In this manner, in addition to ensuring a firm resting base for the thin part 12, the finish of the rim 13 of the crown 10 is also improved.

20

The anchoring parts 14-19 are formed on the thin part 12 to allow the anchoring of the harness 11 and include loops that protrude with respect to the surface of the thin part 12. In particular, whereas the surface of the thin part 12
25 follows the profile of the crown and adheres to it, the loops 14-19 protrude from the crown 10 and are separated from it so as to allow to pass a strap between each loop and the crown 10. The anchoring parts 14-19 are preferably arranged at the position of a so-called sweatband 20.

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The harness 11 includes a plurality of straps 21 made of synthetic fiber. Each strap is anchored to an anchoring part 14-19. In particular, one end of each strap 21 includes an eyelet 22 for supporting a ring 23. The strap
5 21 passes through the ring 23 after turning around an anchoring part 14-19. The ring 23 is preferably made of synthetic fiber cord.

In an upward region, the straps 21 are tied together by a
10 cord 24 which is closed in a loop with an adjustable knot 25. By undoing the knot 25 and the cord 24 it is possible to remove all the straps 21 through the anchoring parts 14-19, so as to fully separate the harness 11 from the crown
10 for cleaning, replacement, et cetera.

15

The straps 21 and the cord 24 are covered with soft materials 26 and 27 which are in turn covered with leather
28.

20 The harness 11 includes a folding chin-rest 29 formed with a strap and a covering flap 30 which is suitable to wrap around the folded chin-rest 29; the covering flap 30 includes a tear-open band 31. In this manner the user can choose between a chin-rest 32 with a single strap arranged
25 under the chin and a chin-rest with two straps, respectively a strap 33 under the chin and a strap 34 in front of the chin.

The harness 11 includes two separate safety straps 35 and
30 36. Each safety strap is anchored, at one end, at a

- 6 -

separate anchoring part of its own located in the rear part of the crown. In particular, the strap 35 is anchored to the anchoring part 15 and the strap 36 is anchored to the anchoring part 16. Each safety strap 35, 36 is furthermore
5 rigidly coupled, at another end, to a so-called chinstrap, respectively 37 and 38. In practice, a single strap forms the chinstrap 37 and the safety strap 35, and likewise a single separate strap forms the chinstrap 38 and the safety strap 36. These two straps 35, 37 and 36, 38 freely support
10 the chin-rest 29. In particular, the chin-rest 29 has two freely sliding eyelets 39 and 40; each eyelet is meant to engage one of the safety straps 35, 36 and the corresponding chinstrap 37, 38. The snap-acting release means 41 allows to release the chin-rest to put on the
15 helmet.

Each chinstrap 37, 38 includes a quick adjustment buckle, respectively 42 and 43, which allows to perfectly fix the harness 11 to the head simply by pulling the ends 44, 45 of
20 the chinstraps 37, 38. In order to release the harness it is sufficient to raise the buckles 42, 43 in the direction indicated by the arrows 46, 47. In this manner, a single simple operation allows to adjust both the chinstrap and the safety strap.

25

The strap 50 is preferably sewn on the inner side of the eyelet 22. Accordingly the release of the harness is simplified. In fact, in order to release the all harness from the helmet, the first step is that of releasing the
30 cord 24 and the strap 21, then, it is enough to simply pull

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the strap 50.

The invention is susceptible of numerous modifications and variations; thus, for example, the thin part 12 may cover
5 the inner upper part of the crown 10, the straps and linkages of the harness might be replaced with other equivalent ones, et cetera.

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CLAIMS

1. Helmet-like bulletproof protection device, comprising: a crown (10) molded from a composite formed with a polymeric material and a reinforcement fiber; an adjustable internal harness (11) which operates by traction and is meant to support the weight of said crown (10); a thin part (12), which is substantially thinner than said crown (10) and is fixed inside it; and anchoring parts (14-19) which are arranged on said thin part (12) to allow the anchoring of said harness (11).
2. Device according to claim 1, wherein said thin part (12) is shaped like a band that internally lines the lower part of said crown (10).
3. Device according to at least one of the preceding claims, wherein said thin part (12) covers the lower rim (13) of said crown (10).
4. Device according to at least one of the preceding claims, wherein said anchoring parts (14-19) comprise loops that protrude with respect to the surface of said thin part (12).
5. Device according to at least one of the preceding claims, wherein said anchoring parts (14-19) are arranged at the position of a so-called sweatband (20).
6. Device according to at least one of the preceding claims, wherein said harness (11) comprises a plurality of

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straps (21), each strap being anchored to one of said anchoring parts (14-19).

7. Device according to claim 6, wherein one end of each one of said straps (21) comprises an eyelet (22) for supporting a ring (23); said strap (21) passing through said ring (23) after winding around one of said anchoring parts (14-19).

8. Device according to at least one of the preceding claims, wherein said harness (11) comprises a folding chin-rest (29) formed by a strap and a covering flap (30) that is suitable to wrap around said folded chin-rest (29); said covering flap (30) comprising a tear-open band (31).

9. Device according to at least one of the preceding claims, wherein said harness (11) comprises two separate safety straps (35 and 36), each strap being anchored, at one end, at a separate anchoring part of its own which is located in the rear region of said device and is rigidly coupled, at another end, to a chinstrap (37, 38); said chin-rest having two freely sliding eyelets (39, 40) for engaging each one of said safety straps (35, 36) and the associated chinstrap (37, 38).

10. Device according to claim 9, wherein each chinstrap comprises a quick adjustment buckle (42, 43).

11. Device according to at least one of the preceding claims, wherein said polymeric material is thermosetting resin, said thin part (12) being made of a thermoplastic

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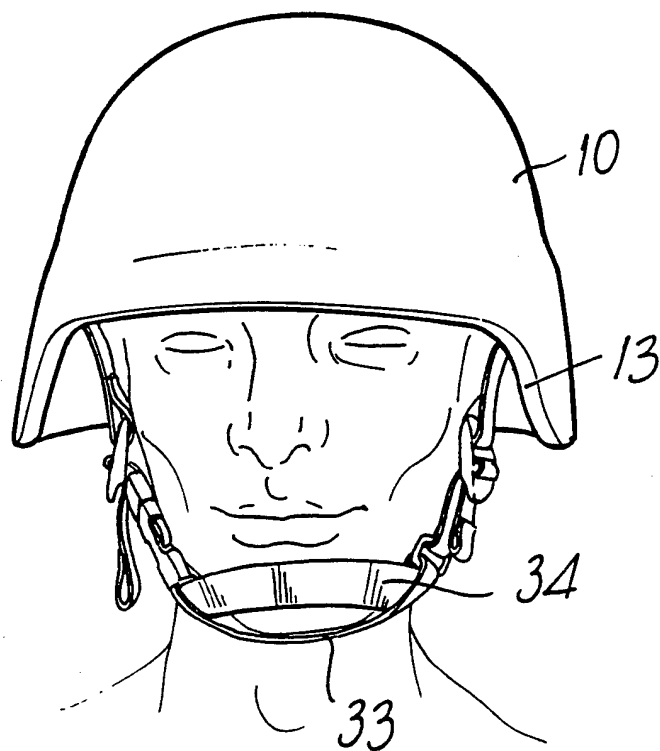
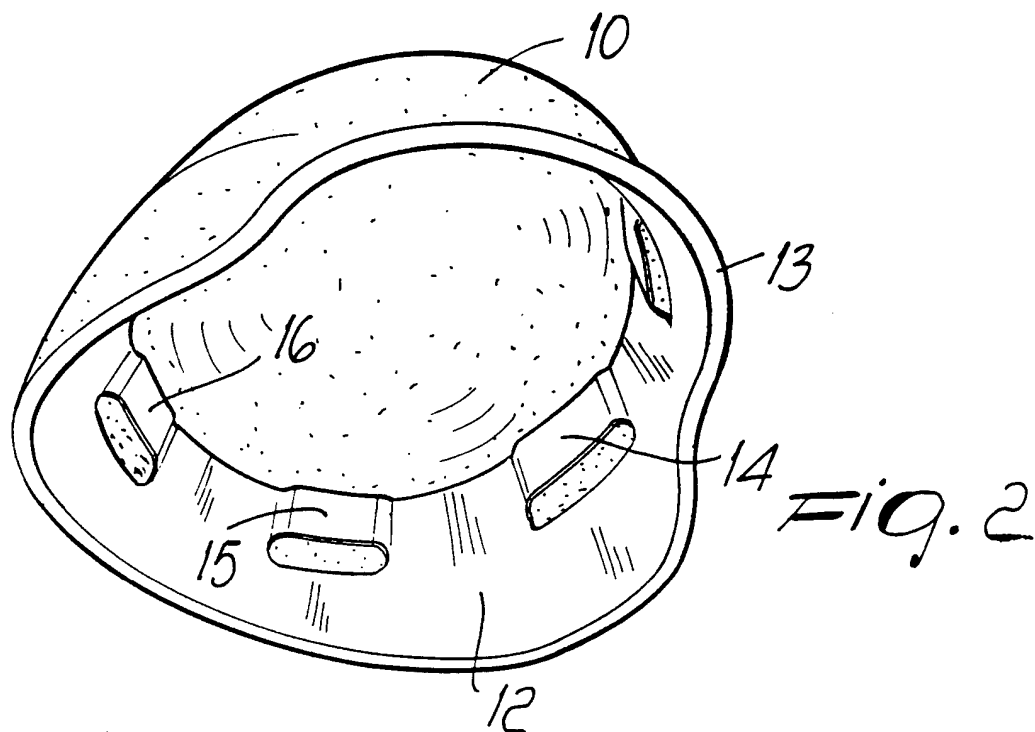
polymer.

12. Device according to at least one of the preceding
claims, wherein said thin part (12) is fixed to said crown
5 (10) by means of an adhesive.

13. Device according to claim 12, wherein said adhesive is
of the polyurethane type.

10 14. Any new characteristic or new combination of
characteristics as described or illustrated.

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*Fig. 1**Fig. 2*

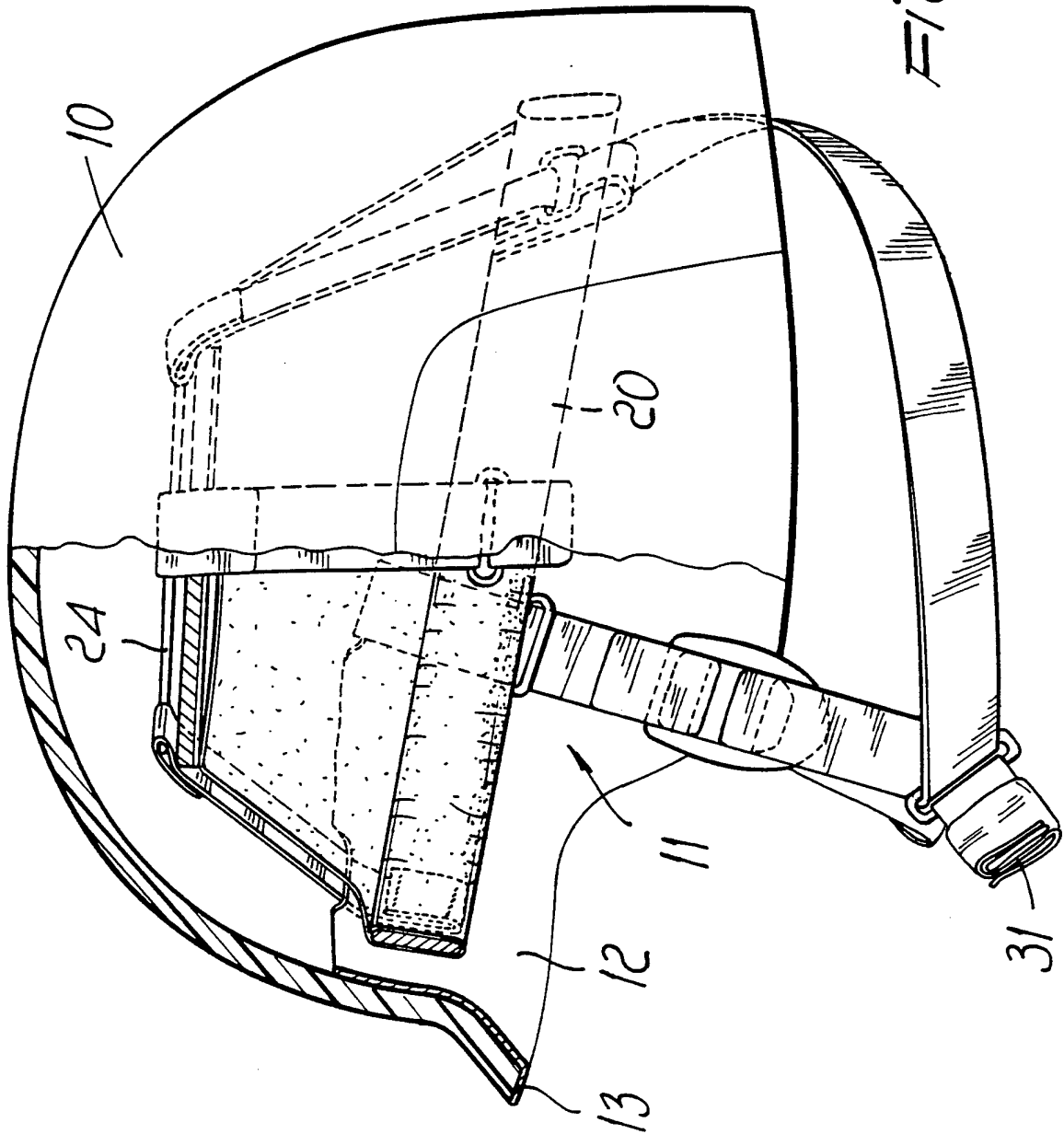
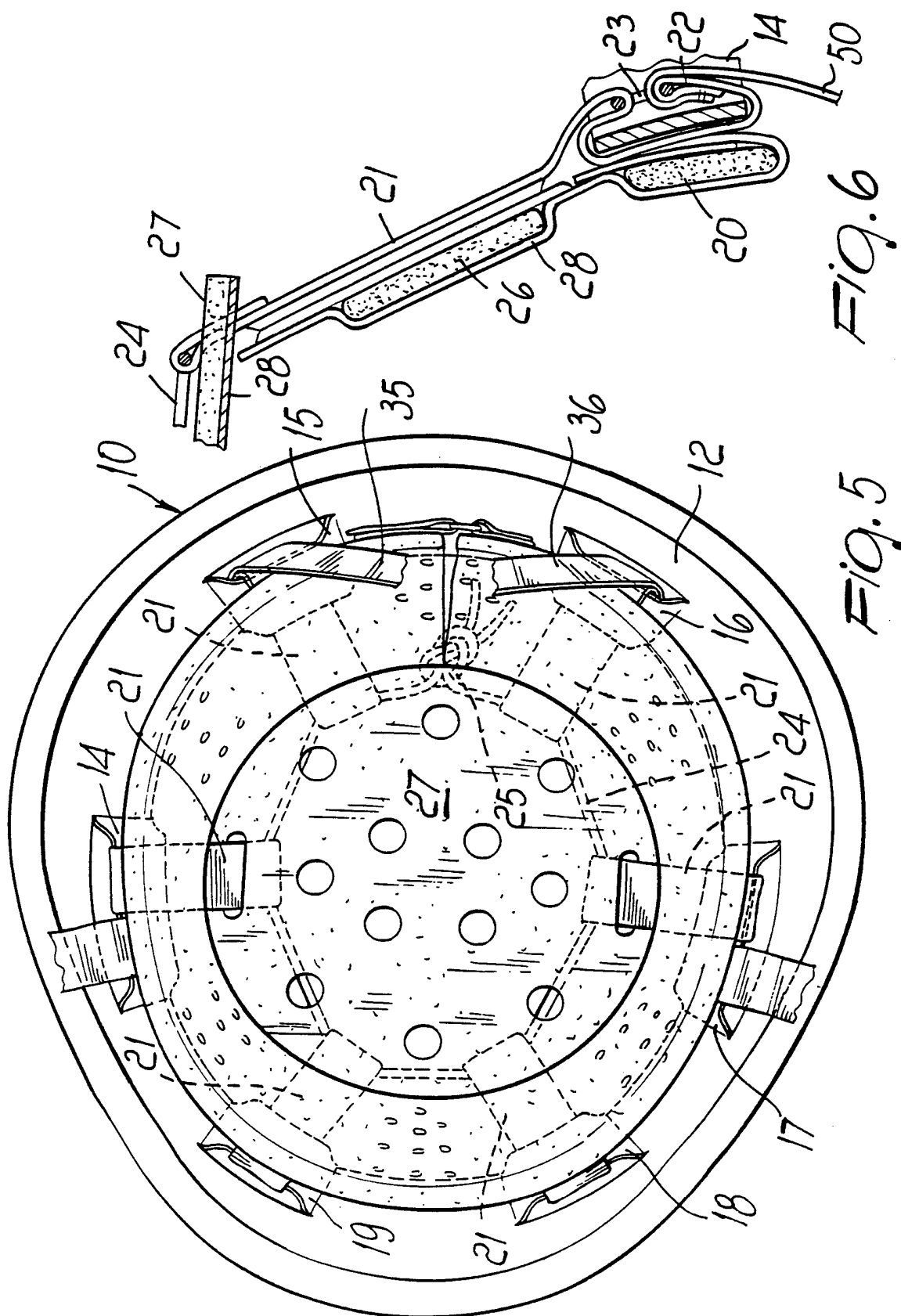


Fig. 3



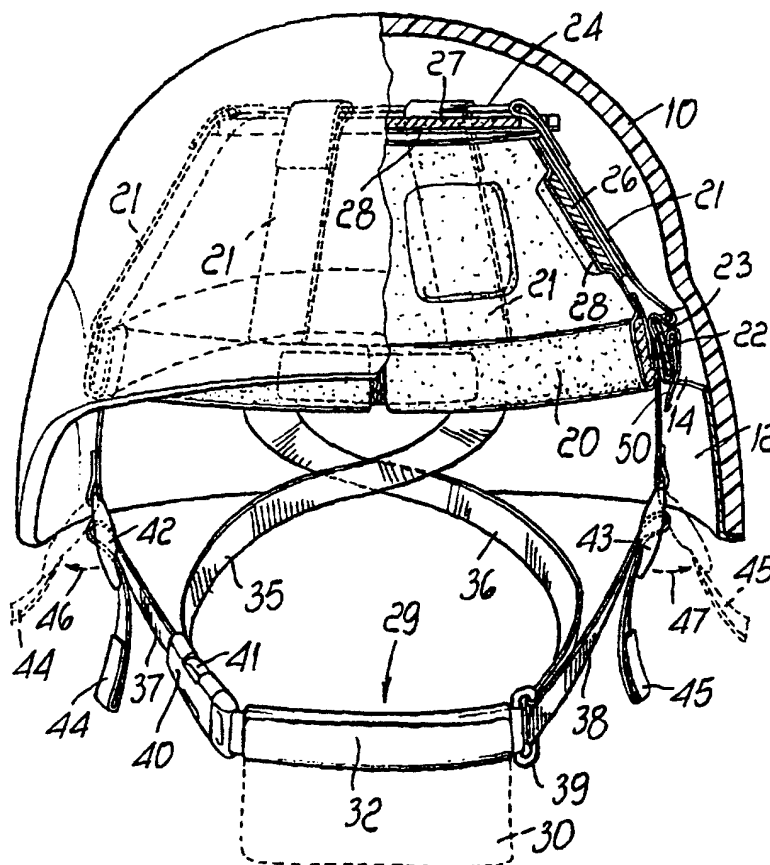


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(54) Title: HELMET-LIKE BULLETPROOF PROTECTION DEVICE**(57) Abstract**

A helmet which includes: a crown (10) molded from a composite formed with a polymeric material and a reinforcement fiber; an adjustable internal harness (11) which operates by traction and is meant to support the weight of the crown; a thin part (12), which is substantially thinner than the crown (10) and is fixed inside it; and anchoring parts (14-19) which are arranged on the thin part (12) to allow the anchoring of the harness (11). The helmet allows to achieve maximum reliability.



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INTERNATIONAL SEARCH REPORT

 Internat Application No
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 A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 A42B3/14 A42B3/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

 Minimum documentation searched (classification system followed by classification symbols)
 IPC 6 A42B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,2 665 422 (D. A. GREEN ET AL) 12 January 1954 see column 2, line 4 - line 46 see column 3, line 11 - line 53 see figures	1-3,5,6
A	---	4,7, 11-14
X	US,A,4 833 735 (R. J. LONG ET AL.) 30 May 1989 see column 2, line 43 - column 3, line 18 see column 4, line 3 - line 17 see figures 1-3	1-3,5,6
A	---	4,7, 11-14
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Date of the actual completion of the international search

4 April 1995

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18.04.95

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X	US,A,3 994 023 (J. A. AILEO ET AL.) 30 November 1976 see column 2, line 46 - line 57 see column 2, line 66 - column 3, line 11 see column 3, line 18 - line 41 see column 4, line 19 - column 5, line 26 see figures 1-5	1-3,5,6
A	---	4,7-14
X	US,A,3 082 427 (T. ZBIKOWSKI) 26 March 1963 see column 1, line 47 - line 67 see column 2, lines 22 - 25, 43 - 58 see figures	1-3
A	---	4-6, 11-14
A	US,A,2 846 683 (E. R. DYE ET AL) 12 August 1958 see the whole document	8-10
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INTERNATIONAL SEARCH REPORT

Information on patent family members

Internati Application No

PCT/EP 94/03429

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US-A-3082427	26-03-63	NONE	
US-A-2846683	12-08-58	NONE	
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DE-U-8601332	12-06-86	NONE	
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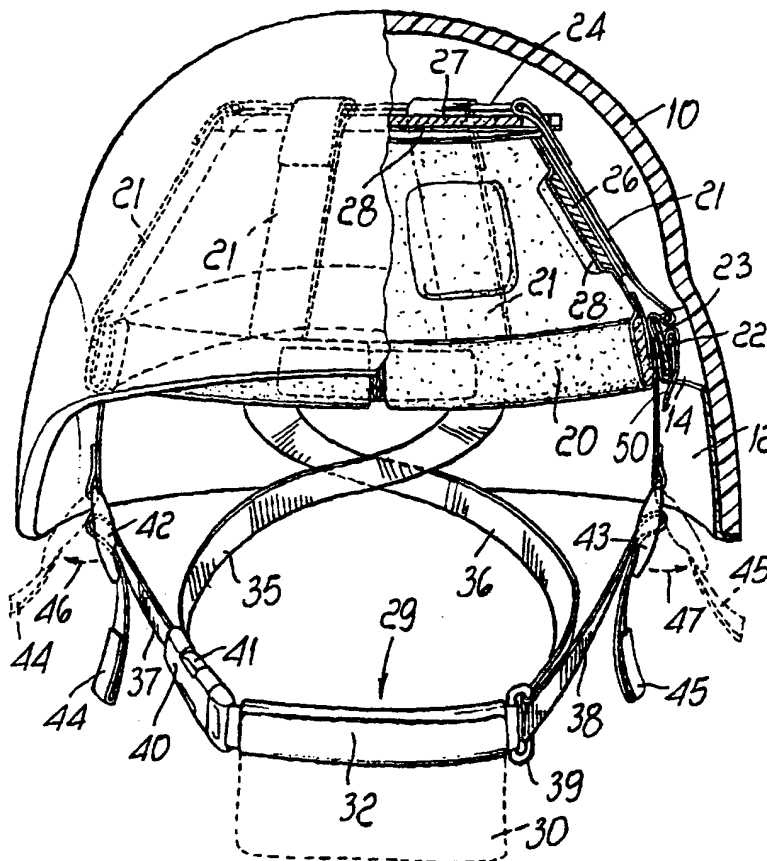
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(57) Abstract

A helmet which includes: a crown (10) molded from a composite formed with a polymeric material and a reinforcement fiber; an adjustable internal harness (11) which operates by traction and is meant to support the weight of the crown; a thin part (12), which is substantially thinner than the crown (10) and is fixed inside it; and anchoring parts (14-19) which are arranged on the thin part (12) to allow the anchoring of the harness (11). The helmet allows to achieve maximum reliability.



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AMENDED CLAIMS

[received by the International Bureau on 2 June 1995 (02.06.95);
original claims 1-14 replaced by amended claims 1-21 (4 pages)]

1. Helmet-like bulletproof protection device, comprising: a crown (10) molded from a composite formed with a polymeric material and a reinforcement fiber; an adjustable internal harness (11) which operates by traction and is meant to support the weight of said crown (10); a thin part (12), which is substantially thinner than said crown (10) and is fixed inside it; and anchoring parts (14-19) which are arranged on said thin part (12) to allow the anchoring of said harness (11); said harness (11) comprising a plurality of straps (21), each strap being anchored to one of said anchoring parts (14-19); one end of each one of said straps (21) comprising an eyelet (22) for supporting a ring (23); said strap (21) passing through said ring (23) after winding around one of said anchoring parts (14-19).

2. Device according to claim 1, wherein said thin part (12) is shaped like a band that internally lines the lower part of said crown (10).

3. Device according to at least one of the preceding claims, wherein said thin part (12) covers the lower rim (13) of said crown (10).

4. Device according to at least one of the preceding claims, wherein said anchoring parts (14-19) comprise loops that protrude with respect to the surface of said thin part (12).

5. Device according to at least one of the preceding claims, wherein said anchoring parts (14-19) are arranged at the position of a so-called sweatband (20).

6. Device according to at least one of the preceding claims, wherein said harness (11) comprises a folding chin-rest (29) formed by a strap and a covering flap (30) that is suitable to wrap around said folded chin-rest (29); said covering flap (30) comprising a tear-open band (31).

7. Device according to at least one of the preceding claims, wherein said harness (11) comprises two separate safety straps (35 and 36), each strap being anchored, at one end, at a separate anchoring part of its own which is located in the rear region of said device and is rigidly coupled, at another end, to a chinstrap (37, 38); said chin-rest having two freely sliding eyelets (39, 40) for engaging each one of said safety straps (36, 36) and the associated chinstrap (37, 38).

8. Device according to claim 7, wherein each chinstrap comprises a quick adjustment buckle (42, 43).

9. Device according to at least one of the preceding claims, wherein said polymeric material is thermosetting resin, said thin part (12) being made of a thermoplastic polymer.

10. Device according to at least one of the preceding claims, wherein said thin part (12) is fixed to said crown (10) by means of an adhesive.

11. Device according to claim 10, wherein said adhesive is of the polyurethane type.

12. Helmet-like bulletproof protection device, comprising: a crown (10) molded from a composite formed with a polymeric material and a reinforcement fiber; an adjustable internal

harness (11) which operates by traction and is meant to support the weight of said crown (10); a thin part (12), which is substantially thinner than said crown (10) and is fixed inside it; and anchoring parts (14-19) which are arranged on said thin part (12) to allow the anchoring of said harness (11); said polymeric material being thermosetting resin, said thin part (12) being made of a thermoplastic polymer; said thin part (12) being fixed to said crown (10) by means of an adhesive; said thin part (12) being shaped like a band that internally lines the lower part of said crown (10).

13. Device according to at least one of the preceding claims, wherein said thin part (12) covers the lower rim (13) of said crown (10).

14. Device according to at least one of the preceding claims, wherein said anchoring parts (14-19) comprise loops that protrude with respect to the surface of said thin part (12).

15. Device according to at least one of the preceding claims, wherein said anchoring parts (14-19) are arranged at the position of a so-called sweatband (20).

16. Device according to at least one of the preceding claims, wherein said harness (11) comprises a plurality of straps (21), each strap being anchored to one of said anchoring parts (14-19).

17. Device according to claim 16, wherein one end of each one of said straps (21) comprises an eyelet (22) for supporting a ring (23); said strap (21) passing through said ring (23) after winding around one of said anchoring parts (14-19).

18. Device according to at least one of the preceding claims, wherein said harness (11) comprises a folding chin-rest (29) formed by a strap and a covering flap (30) that is suitable to wrap around said folded chin-rest (29); said covering flap (30) comprising a tear-open band (31).

19. Device according to at least one of the preceding claims, wherein said harness (11) comprises two separate safety straps (35 and 36), each strap being anchored, at one end, at a separate anchoring part of its own which is located in the rear region of said device and is rigidly coupled, at another end, to a chinstrap (37, 38); said chin-rest having two freely sliding eyelets (39, 40) for engaging each one of said safety straps (36, 36) and the associated chinstrap (37, 38).

20. Device according to claim 19 wherein each chinstrap comprises a quick adjustment buckle (42, 43).

21. Device according at least one of the preceding claims, wherein said adhesive is of the polyurethane type.

AMENDED SHEET (ARTICLE 19)